WHAT IS CLAIMED IS:

1. A method, the method comprising:

using ion beam deposition to deposit a first multilayer stack of thin films on a substrate to planarize and smooth surface defects on the substrate; and

using atomic layer deposition to deposit a second multilayer stack of thin films on the first multilayer stack of thin films, the second multilayer stack of thin films comprising an extreme ultraviolet reflective multilayer stack.

2. The method of Claim 1, wherein the first multilayer stack of thin films comprises alternating layers of thin film layers, the alternating layers of thin film layers comprise one of Molybdenum and Silicon thin films, Molybdenum and Beryllium thin films, and Molybdenum and Silicon compound thin films, wherein the Silicon compound comprises one of Silicon Nitride and Silicon Dioxide.

3. The method of Claim 1, wherein the second multilayer stack of thin films comprises alternating layers of thin film layers, the alternating layers of thin film layers comprise one of Molybdenum and Silicon thin films, Molybdenum and Beryllium thin films, and Molybdenum and Silicon compound thin films, wherein the Silicon compound comprises one of Silicon Nitride and Silicon Dioxide.

4. The method of Claim 1, wherein the first multilayer stack of thin films comprises 20 to 40 alternating layers of thin film layers, wherein the alternating layers of thin films comprise a first film and a second film with different optical properties.

5. The method of Claim 1, wherein the second multilayer stack of thin films comprises 40 to 60 alternating layers of thin film layers, wherein the alternating layers of thin films comprise a first film and a second film with different optical properties.

6. The method of Claim 1, wherein the second multilayer stack of thin films comprises fewer surface defects than the first multilayer stack of thin films.

7. The method of Claim 1, further comprising processing an extreme ultraviolet mask blank to form an extreme ultraviolet reflective mask.

8. The method of Claim 7, the processing an extreme ultraviolet mask blank to form an extreme ultraviolet reflective mask comprising:

depositing a buffer layer on the second multilayer stack of thin films;

depositing an absorber layer on the buffer layer; and

depositing a resist layer on the buffer layer.

9. The method of Claim 8, the processing an extreme ultraviolet mask blank to form an extreme ultraviolet reflective mask further comprising:

patterning and developing the resist layer;

pattering the absorber layer;

removing the resist layer; and

patterning the buffer layer.

10. An apparatus, the apparatus comprising:

a substrate;

a first multilayer of films on top of the substrate to form a flat top surface by a first deposition process; and

a second multilayer of films on top of the first multilayer of films, the second multilayer of films effectuating a Bragg reflector to reflect extreme ultraviolet radiation, the second multilayer of films being deposited with a second deposition process.

11. The apparatus of Claim 10, wherein the first and second multilayers of films comprise alternating layers of films, wherein the alternating layers of films comprise a first film and a second film with different optical properties.

12. The apparatus of Claim 11, wherein the first and second multilayers comprise one of Molybdenum and Silicon films, Molybdenum and Beryllium films, and Molybdenum and

Silicon compound films, wherein the Silicon compound comprises one of Silicon Nitride and Silicon Dioxide.

13. The apparatus of Claim 11, wherein the substrate comprises a low thermal expansion substrate.

14. The apparatus of Claim 11, wherein the first deposition process is an ion beam deposition process, and the second deposition process is an atomic layer deposition process.

15. The apparatus of Claim 11, wherein the first multilayer of films smooths surface defects on the substrate.

16. The apparatus of Claim 15, wherein the first multilayer of films planarizes and smooths surface defects of 50nm or less on the substrate.

17. The apparatus of Claim 16, wherein the first multilayer of films comprises a range of 20 to 40 alternating layers of films.

18. The apparatus of Claim 11, wherein the second multilayer of films comprises a range of 40 to 60 alternating layers of films.

19. The apparatus of Claim 10, wherein the apparatus is an extreme ultraviolet mask blank.

20. The apparatus of Claim 19, wherein the extreme ultraviolet mask blank is processed to form an extreme ultraviolet mask.

21. A system, the system comprising:

an extreme ultraviolet (EUV) source to produce extreme ultraviolet radiation;

a first reflective guiding module to receive and direct the extreme ultraviolet radiation;

an extreme ultraviolet mask to reflect the extreme ultraviolet radiation from the first reflective guiding module and produce reflected radiation having a spatial pattern, the extreme ultraviolet mask comprising:

a first multilayer of thin films being adapted for smoothing surface defects on a extreme ultraviolet mask substrate; and

a second multilayer of thin films on top of the first multilayer of thin films comprising a reflective multilayer for extreme ultraviolet radiation, the second multilayer of thin films being deposited with a different deposition process than the first multilayer of thin films;

a second reflective guiding module to receive the reflected radiation from the extreme ultraviolet mask; and

a substrate platform to hold a substrate for exposure to the reflected radiation from the second reflective guiding module.

22. The system of Claim 21, wherein the first multilayer of thin films comprises 20 to 40 alternating layers of thin films and the second multilayer of thin films comprises 40 to 60 alternating layers of thin films, wherein the alternating layers of thin films comprise a first film and a second film with different optical properties.

23. The system of Claim 22, wherein the alternating layers of thin films comprise one of Molybdenum and Silicon thin films, Molybdenum and Beryllium thin films, and Molybdenum and Silicon compound thin films, wherein the Silicon compound comprises one of Silicon Nitride and Silicon Dioxide.

24. The system of Claim 21, wherein the extreme ultraviolet mask substrate comprises one of a low thermal expansion substrate and a glass substrate.

25. The system of Claim 21, wherein the second multilayer of thin films comprises fewer defects than the first multilayer of thin films.

26. The system of Claim 25, wherein the first multilayer of thin films is deposited with ion beam deposition, and the second multilayer of thin films is deposited with atomic layer deposition.

27. An apparatus, the apparatus comprising:

a low thermal expansion substrate;

a first multilayer of thin films on top of the low thermal expansion substrate, the first multilayer of thin films being deposited with ion beam deposition; and

a second multilayer of thin films on top of the first multilayer of thin films, the second multilayer of thin films comprising a multilayer reflective to extreme ultraviolet radiation, the second multilayer of thin films being deposited with atomic layer deposition.

28. The apparatus of Claim 27, wherein the first multilayer of thin films comprises 20 to 40 alternating layers of thin films and the second multilayer of thin films comprises 40 to 60 alternating layers of thin films, wherein the alternating layers of thin films comprise one of Molybdenum and Silicon thin films, Molybdenum and Beryllium thin films, and Molybdenum and Silicon compound thin films, wherein the Silicon compound comprises one of Silicon Nitride and Silicon Dioxide.

29. The apparatus of Claim 28, wherein the apparatus further comprises:

a patterned buffer layer on top of the second multilayer of thin films, the patterned buffer layer comprising an oxide layer; and

a patterned absorber layer on top of the patterned buffer layer, the patterned absorber layer comprising a metal.